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(54) Interactive call-handling.

(57) Calls made from telephone terminals T1-Tn via a telephone network C are handled within a receiving station D by processing systems P1-Pn that by means of automated voice messages prompt the callers through an interactive sequence (Fig 3) to operate their telephone push-buttons 14 to signal digital data to the station D. Digital data received from each caller and derived otherwise from his call, is stored in a processor-memory cell C1 (Figs 2 and 4) and, according to the processor operating format selected, gives specific identification of the caller, health data, and call sequence-order or time, together with processor-derived data which the caller is prompted to signal back to the processor for confirmatory purposes. Selection of format, and with it the particular processor PR1-PRn used, depends upon the number called, and may alternatively relate to telephone-order purchasing (Fig 5), participation in a lottery, or participation in a TV auction, gameshow (Fig 7) or opinion-poll. The caller is first checked for qualification to participate - this may depend upon entry of a one-time key signal by the caller - and after data gathering, processing of the data, for example to isolate a subset of callers or analyze it statistically, is carried out.

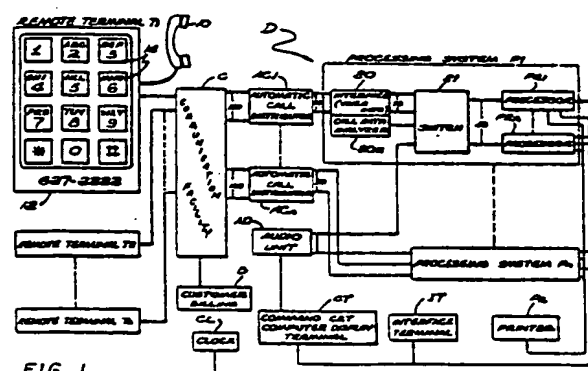


FIG. 1

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Interactive Call-Handling

This invention relates to interactive call-handling in which calls from a multiplicity of terminals of a communication system are received at a receiving station, automated voice responses to the calls are made from the receiving station to the calling terminals prompting the callers to transmit digital-signal data to the receiving station via the communication system, and digital-signal data transmitted via the communication system by the individual callers in response to the voice prompting is received at the receiving station.

Interactive call-handling of the above-specified kind has been proposed in which telephone callers are interfaced with a computer facility, and recorded voice messages prompt callers to signal digital data to the computer facility by actuating the alphanumeric dialling buttons that are conventionally provided on telephones. In this respect, a caller may actuate the dialling buttons to obtain access to information stored in the computer facility or to convey information to it in accordance with some desired service function. Generally, such systems are of somewhat limited scope, and often involve difficulties that are frustrating or confusing to a caller.

It is an object of the present invention to provide a method of, and a system for, interactive call-handling of the said above-specified kind, that may be used to enhance and broaden the scope and application of such call handling.

According to one aspect of the present invention, a method of interactive call-handling of the said above-specified kind, is characterised in that the digital-signal data received at the receiving station in respect of each individual call of a plurality of such calls, is stored in relationship with other digital-signal data received or otherwise derived at the receiving station in respect of that individual call, and that at least part of the data stored in respect of each of the plurality of calls is for qualifying the caller in regard to the performance of a predetermined function for which the performance and/or outcome is dependent upon at least part of the data stored.

Different voice promptings may be provided, and different functions may be performed, according to the calling signals received at the receiving station from the caller. Furthermore, any one of a multiplicity of different processing formats may be performed according to caller-selection, and in this case performance of at least one of the processing formats when so selected may include initiation of a memory file individual to the caller and storage in this file of data dependent on the timing or other sequence-order of the call in relation to other calls,

and data dependent on the caller's response to voice prompting together with, or including, identification of the caller. At least part of data received from the caller or otherwise derived in respect of the call may be stored in encrypted form.

The said other digital-signal data involved in the method may be, at least in part, data that is received in response to further voice prompting of the caller during the call, and may include data derived in dependence upon the timing or other sequence-order of the call in relation to other calls received.

The step of qualifying each caller may depend upon the caller signalling a key to the receiving station. The key in this respect may be effective just once (or only some other limited number of occasions) for qualification in regard to performance of the relevant function. As an alternative, or in addition, the receiving station may prompt the caller to signal back to the receiving station digital data that has been derived at the receiving station, qualification then being dependent on the outcome of a check carried out at the receiving station on the digital-signal data received from the caller in response to the prompting.

The method of the present invention is applicable to the performance of a function in which there is analysis of the data stored in respect of a multiplicity of calls, towards, for example, identifying a specific subset of the callers within the set of all callers. For example, it may be desirable to identify a set of persons, such as a demographically-controlled group, or a specifically-entitled group, then statistically analyze data from the set so as to identify accurately certain persons in the group and select from the set a subset of at least one person. Specifically, it may be desirable to obtain medical data from an entitled group of people, to correlate such data, perhaps introduce external data, and then identify a select subset of the group. Alternatively, the stored data may be processed (also perhaps in relation with other externally-entered data) according to a functional operating format that is appropriate, for example, to an auction sale, a lottery, a poll, a merchandising operation, or a game.

According to another aspect of the present invention, a system for interactive-call handling of the said above-specified kind, is characterised in that the receiving station includes one or more data processing means that include memory for storing digital-signal data received at the receiving station in respect of each individual call of a plurality of such calls, that such data is stored in the memory in relationship with other digital-signal data re-

ceived or otherwise derived at the receiving station in respect of that individual call, that the processing means is operative to qualify the caller in regard to the performance of a predetermined function by the call-handling system, such qualification being made in accordance with at least part of the data stored in the memory in respect of the call, and that the performance and/or outcome of said function is dependent upon at least part of the data stored.

As with the method, different voice promptings may be provided, and different functions may be performed, according to the calling signals received at the receiving station from the caller. Also, the one or more processing means of the system may be adapted to operate according to a multiplicity of different processing formats, and the selection of the processing format to be performed in respect of any call may be dependent upon signals transmitted in, or otherwise derived from, that call. At least one of the processing formats may include, when selected, initiation of a memory file individual to the caller and storage therein of data that is dependent on the timing or other sequence-order of the call in relation to other calls, and data dependent on the caller's response to voice prompting together with, or including, identification of the caller.

Encrypting means may be included in the system to encrypt at least part of data received from the caller or otherwise derived in respect of the call.

Various embodiments of the method and system of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

FIGURE 1 is a block schematic diagram of a system constructed in accordance with the present invention;

FIGURE 2 is a fragmentary diagrammatic representation of a storage cell format of the system;

FIGURE 3 is a flow diagram of an operating format of the system;

FIGURE 4 is a block schematic diagram of a processor for use in the system;

FIGURE 5 is another fragmentary diagrammatic representation of a storage cell format of the system;

FIGURE 6 is a block schematic diagram of part of a processing unit of the arrangement of FIGURE 4;

FIGURE 7 is a further fragmentary diagrammatic representation of a storage cell format of the system;

FIGURE 8 is a block schematic diagram of elements that form part of the arrangement of FIGURE 4; and

FIGURE 9 illustrates the manner in which parts of the system of FIGURE 1 may be distributed at spaced geographical locations.

Referring to FIGURE 1, a multiplicity of generally-similar telephone-instrument terminals T1 to Tn (of which only the terminal T1 is illustrated in detail) are coupled to a communication facility C that may take the form of a comprehensive public telephone system for establishing interconnections between the remote terminals. The terminals T1-Tn, which may be conventional telephone terminals, are connectable through the facility C to a central station D, so that callers using the individual telephone terminals T1-Tn can interface the station D via the communication facility C for speech and digital-data communication with it.

The central station D is operable to screen or qualify each individual caller as a preliminary to acceptance of the call, and to collect, correlated and test data received from the caller for processing in conjunction with various programs and external data. Various objectives may be accomplished in this way, and in this respect, for example, a select subset of the callers may be isolated and specifically identified, or related data may be processed, or transactions may be actuated. The possibilities for application of the system are substantial and varied as will be apparent from the exemplary structure and functions described in detail below.

In one operating process format, the public might be polled with regard to locating the specific purchasers of a defective or dangerous product. Alternatively, the public might be polled with the object of locating persons susceptible to a specific ailment or disease. Public auctions of unprecedented participation are possible, and legal lotteries are enabled that are interesting, effective and very economical on an individual participant basis. The system also might be employed in various game formats or to automate a promotion or mail-order operation, even to the extent of including inventory control. In each functional operating format, the callers may be variously qualified on the basis of entitlement, and may be identified for subsequent verification. The callers then may be prompted, either through the interface or externally, to provide appropriate data.

Considering the system of FIGURE 1 in greater detail, the communication facility C has multiplexing capability for individually coupling a substantial number of the terminals T1-Tn to the central station D concurrently, on request. Each telephone terminal T1-Tn, and as illustrated specifically in the case of terminal T1, includes a hand-piece 10 (microphone and earphone) and a panel 12 provided with a rectangular array of push-buttons 14 in

the conventional configuration. As normally, the hand-piece 10 generates analog signals in accordance with the caller's voice, and transduces analog signals received into voice signals to be heard by the caller; the panel 12, on the other hand, generates digital signals in accordance with operation of the push-buttons 14.

According to common telephone practice, alphabetic and numeric designations are provided on the buttons 14. For example, several of the buttons 14 carry three letters along with a decimal digit. Specifically, the button designated with the numeral "2" also carries the letters "A", "B" and "C". In that manner, the buttons 14 encompass the numerals "0-9", two symbols, and the whole alphabet apart from the letters "Q" and "Z". Consequently, the buttons 14 accommodate the entry of decimal data, and to some extent alphabetic data.

The buttons 14 designated with symbols "" and "#", along with the numeral "0", can be used by predetermined assignment to represent the letters "Q" and "Z" or any of a variety of other data or command components. Generally, the buttons 14 are employed to formulate digital data at the central station D in any of a number of various formats determined by the specific use and operating format currently operative in the system.

The communication facility C is coupled to interface a series of processing systems P1 to Pn in the central station D. Specifically, the communication facility C is connected to the processing systems P1-Pn through an associated series of automatic call distributors AC1 to ACn. The distributors AC1-ACn may take various forms well known in the prior art, each functioning to queue incoming calls for connection to a lesser number of lines. More particularly, each automatic call distributor AC1-ACn in the present example, accommodates one hundred lines from the communication facility C and may, accordingly, accommodate and queue up to 100 calls. The distributors AC1-ACn are connected to the processing systems P1-Pn respectively, each via fifty lines that are coupled into the respective system through an interface 20 and a switch 21. Thus, in this example, each of the automatic call distributors AC1-ACn can accommodate one hundred lines, fifty of which may be active at the same time in association with one of the processing systems P1-Pn.

The processing systems P1-Pn are similar to one another (so only one, system P1, is shown in any detail in FIGURE 1), and are collectively interconnected with a command computer terminal CT, at least one interface terminal IT, at least one printer PR, and an audio unit AD. The command terminal CT is separately coupled to the audio unit AD, and each processing system P1-Pn contains a number of individual function units or processors

PR1 to PRn. Although various other configurations and arrangements may be employed, the explanation is facilitated by including a plurality of individual function units as treated in detail below.

Considering the processing system P1, fifty lines from the automatic call distributor AC1 are connected to the interface 20, an exemplary form of which may be the commercially-available Centrum 9000 unit. The interface 20 incorporates modems, tone decoders, switching mechanisms and an automated-voice capability, and also a dialled-number identification system (DNIS) and an automatic number identification (ANI) capability that are manifested at least partly in a call data analyzer 20a. Analysis of data may be performed in the interface, but for simplicity, it will be assumed that all major analysis is carried out in the processors PR1-PRn.

Generally, DNIS capability is related to a function of the communication facility C (the composite telephone system) to provide data that indicates the called number. ANI capability is a similar function whereby digital data is provided indicating the calling number. Both capabilities are available for use with equipment such as the interface 20, to provide control through the call data analyzer 20a.

The interface 20, which can accommodate up to fifty independent calls concurrently on separate communication paths to the central station D, is capable of providing analog (voice) signals to prompt each caller. Also accommodated are digital signals including the DNIS and ANI signals, and there is the possibility of utilizing sequences of lines in rotary as well as blocking sequences, the numbers for which command a particular program or operation format of a function unit referred to below. The fifty lines are connected through the interface 20 to a switch 21 which is in turn coupled to fifty function units, or processors PR1-PRn.

As indicated above, multiple function units, or processors, are described in the disclosed embodiment to facilitate the explanation. Non-parallel techniques and multiplexed operations might well be employed as alternatives. For a similar reason, as disclosed herein, each of the processors PR1-PRn includes memory cells for each of the callers' individual data, and the development and compilation of data in such cells according to various operating formats, is described.

The processors PR1-PRn are connected collectively to the command computer terminal CT which incorporates a CRT display for displaying visually data relating to select sub-sets of the callers, and also to the interface terminal IT, and to the printer PR. They may comprise a microcomputer, for example, programmed as suggested above and as disclosed in detail below to accomplish specific operating formats. As an integral part of such for-

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mats, a caller may be qualified as belonging to an entitled set of persons or to accommodate specific demographic objectives. Also, callers may be designated both with respect to their individual significance and their identification. For example, callers may have different significance in a format, depending on the time or sequence of their call. Also, the designation of a caller may be important in regard to his eventual isolation as part of a subset. As described below, the designations may involve multiple elements which may include: random number assignments, encryption techniques, utilization of calling numbers, identification data, sequence of call, and so on to facilitate reliable verification. It is to be noted, furthermore, that the communication facility C has a customer billing structure B that is interfaced by the system.

On the qualification and designation of callers, the system enters a data accumulation phase during which digital data (formatted at one of the telephone terminals T1-Tn) is processed by one of the processors PR1-PRn. In general, the processing evolves a subset (at least one caller) the members of which may be verified and confirmed.

Either during the data accumulation phase, or after the processing phase to isolate a subset, a distinct operation may involve actuating the interface terminal IT for direct local communication between the caller and an operator at the terminal IT. Another distinct operation may involve actuation of the printer PR to provide documents in relation to the operating format, such as for providing award certificates or for verifying members of an isolated subset. Also, charge slips may be generated containing at least part of the data of a particular transaction.

Operation of the system of FIGURE 1 to isolate a subset of people who are susceptible to a particular disease or infirmity, will now be described. Such operation might involve a geographical area, such as a large city or population centre, in which a particular health problem is somewhat acute. For example, a major population centre might be polled where coronary artery disease is a significant problem, with the object of identifying persons most susceptible to such disease, for corrective recommendations.

People of the population centre could be informed of the availability of a service for statistical health analysis. Accordingly, persons interested in their individual statistical situation would be motivated to utilize the service. Specifically, individual callers would use the remote terminals T1-Tn to contact the central station D through the communication facility C and thereby provide personal information that would enable a statistical analysis in relation to existing data so as to isolate and inform (either in real time or batch basis) those persons

statistically most likely to be in need of corrective measures. In such applications, it may be important that the caller's identity be subject to reliable verification. Other applications or programs may also present a critical need for positively verifiable identification to the extent that credit card numbers and/or personal identification numbers may be employed.

The operation of the system with regard to a specific caller who wishes to pursue health-related information on the basis of statistical analysis, will be described referring also to FIGURES 2 and 3. FIGURE 2 illustrates a data storage format for a memory cell in, say, the processor PR1 of the system, and FIGURE 3 shows the sequence of operations involved in storing data concerning the caller, in the cell.

Pursuing the example, it will be assumed that the caller is at the remote terminal T1, and that this has the telephone number (213) 627-2222. The caller lifts the hand-piece 10 and actuates the push-buttons 14 in accordance with conventional techniques to call for a select operating format, for example by punching in the telephone number (213) 627-3333. Communication is thereby established through the facility C with the appropriately-designated function unit, namely the processing system P1 containing the processor PR1, at the central station D. On receiving the call signal, the automatic call distributor AC1 associates the called number (that is, (213) 627-3333, made available using standard telephone DNIS techniques) with the processor PR1 relevant to formatting the health-related program, and establishes connection with it via the interface 20 and the switch 21. In response, the processor PR1 cues the interface 20 to generate a voice signal for transmission to the caller. The sequence of operation described is represented in FIGURE 3 as commencing with the "enter" block 40 which is accordingly followed by a "cue voice generator" command block 42.

If ANI equipment is not employed in the system, the voice generator in the interface 20 formulates speech, a representative form of which might be: "Thank you for participating in the coronary artery disease statistical analysis. Please give us your telephone number by actuating the call buttons on your telephone instrument." Acting on the instructions, the caller would push the buttons 14 in sequence to signal his telephone number, "(213) 627-2222"; if the communication facility C has ANI equipment, signals indicative of this number will be produced automatically.

The signals in accordance with the calling number ((213) 627-2222), are communicated from the interface unit 20 (FIGURE 1) to the processor PR1 for testing whether the telephone number is valid or entitled. Essentially, the format of a proper

number prompts production of a valid or "good" signal. The test is indicated by the block 44 in FIGURE 3. If the response is not valid or entitled, for example if it contains an inappropriate number of digits or has been used to a point of excess, operation of block 46 (FIGURE 3) is initiated to again cue the voice generator. The voice generator accordingly instructs the caller, e.g.: "You have not entered a proper telephone number. Please re-enter your telephone number by pressing the appropriate call buttons." The caller is then allotted a predetermined period of time within which to make a proper entry with the consequence that the system moves to a test operation as indicated by the block 48 (FIGURE 3). Specifically, block 48 poses the query: "Is the second try good?"

If the caller is again unsuccessful, the system purges the record as indicated by the block 50 in FIGURE 3, and the call is terminated as indicated by the block 52. In an alternative mode, the processor PR1 may abort the interface and couple the interface terminal IT for direct personal communication with the caller. The interchange would then proceed, person-to-person.

On the other hand, if the caller signals the proper telephone number, the operation proceeds. Specifically, the system sequences to record the response of the proper telephone number as indicated by the block 45 in FIGURE 3. That is, the caller's telephone number is recorded in an assigned specific memory cell identified with the caller; the format of the cell C1 is indicated in FIGURE 2. The first portion of the cell C1, section 53 illustrated in FIGURE 2, contains a form of identification data, namely the caller's telephone number, (213) 627-2222.

The same applies if, as manifest by the block 48 (FIGURE 3), it is only on the second attempt that a proper number is signalled. In either case, exiting from the block 54 (FIGURE 3) invokes the next operation of again cueing the voice generator as indicated by the block 56.

As an alternative format, if a selective-group polling operation is performed, or callers are otherwise to be cleared for entitlement as mentioned above, a caller may be qualified by providing a "one-time" key number. The processor PR1 may incorporate a look-up table for proper key numbers which numbers may be coded using any of a wide variety of techniques. As a simple illustrative example, the key may comprise a precise number of digits that always total a particular numerical value.

The system proceeds after the caller is qualified. Specifically, the cue to the voice generator of the interface 20 (FIGURE 1) as represented by the block 56 produces a request for further information from the caller with further identification data and answer data. For example, the voice generator

might request information by stating: "Please use the telephone buttons to indicate initials of your name."

The detailed operation is not represented in FIGURE 3 as it is similar to the operation illustrated by the blocks 42 through 54. However, again, a proper response is registered in the storage cell C1 as illustrated in FIGURE 2 by the number "53" also registered in the first section 53 of the cell.

The cycle of obtaining digital information from the caller is next repeated with respect to answer data, i.e. specific health data. For example, as illustrated in FIGURE 2, the next section 58 in the cell C1 receives an accumulation of health data, including the caller's age, weight, pulse rate, ... etc. Representative digital numbers are illustrated in FIGURE 2.

During the course of the telephonic communication, the processor PR1 formulates identification data for the caller specifically including: the chronological sequence of the call, the assigned designation of the call, and a set of acknowledgment digits for the call. Such data identification is registered in the caller's assigned cell C1 in accordance with the format of FIGURE 2 being stored in sections 62, 64 and 66. The data may be stored in a coded interrelationship; for example, the acknowledgment digits may be related to the call record sequence. In the illustrative example, the chronological order number of the caller is 4951. The acknowledge digits may be derived from the sequence number. For example, as illustrated, a coded relationship may be established by adding "two" to each of the individual record sequence digits. Considering the example numerically: Adding without propagated carries:

$$\begin{array}{r} 4951 \\ 2222 \\ \hline 6173 \end{array}$$

It is to be noted that the use of confirmation data in the form of acknowledgement digits can be extremely advantageous and important, especially for the purpose of communicating with an isolated member of a subset. For example, identification could be published or circulated, as by a television broadcast, then respondents checked by use of confirmation data that may be confidential.

Continuing with the above example, the call chronological sequence registered for the caller is 4951 as represented in the section 62, while the acknowledge digits are 6173 as registered in the section 66. Additionally, the processor PR1 develops an assigned designation number, e.g. designation "4951684", which is registered in the section 64, the acknowledge code or digits, e.g. 6173,

being registered in the section 66. These values are formulated in accordance with conventional number techniques during the data acquisition phase.

Operation proceeds with the processor PR1 (FIGURE 1) cueing the internal memory, as is indicated by the block 68 (FIGURE 3). As a consequence, the processor PR1 fetches the call record sequence number, assigns a designation (if not previously assigned), and encodes the sequence number to form the acknowledgment digits (if not previously accomplished); these operations are indicated by the block 70 (FIGURE 3). Next, the processor PR1 (FIGURE 1) cues the voice generator in the interface 20, as indicated by the block 72 (FIGURE 3), to provide information to the caller. Specifically, for example, the voice generator in the interface 20 (FIGURE 1) might signal: "This transaction has been designated by the number 4951684, and is further identified by the acknowledgment digits 6173. Please make a record of these numbers while they are repeated. Specifically, the designation number is 4951684. The acknowledgment digits are 6173. Please acknowledge this transaction by pressing your telephone buttons to indicate the acknowledge digits 6173." In various applications, such as those involving security, the order and acknowledgment of callers may be very important; data for use in confirmation of the order, may therefore be important.

The system next proceeds to the test mode as indicated by the block 74 (FIGURE 3). If the caller provides the correct acknowledgment digits, the data is confirmed in the record as indicated by the block 76 (FIGURE 3) and is registered in the cell C1 (FIGURE 2). Additionally, the voice generator is sequenced as indicated by the block 78 (FIGURE 3) to indicate the close of the communication and that the transaction is terminated, as represented by the exit block 80 in FIGURE 3.

In the event that a caller cannot confirm his acknowledgment digits, as indicated by the block 74 in FIGURE 3, a repeat operation is performed as indicated respectively by the blocks 82 and 84. Specifically, the voice generator is cued for a second instructional message. In the event that the second attempt also fails, the data is purged and the call discounted as indicated by block 86 and the exit block 88. If the second try is successful (test block B4), as indicated by the block 76, the record is perfected as indicated above.

As a result of the likelihood of a large number of calls, data cells in the processors PR1-PRn (FIGURE 1) are developed with specific information indicative of a statistical sampling of the populace of concern. The data of that statistical sampling may be self-generating of specific conclusions with respect to a subset of individuals, and/or sup-

plemental data to clearly manifest a significant subset. For example, the data may indicate a significant departure from an assumed normal characteristic. Such data, accumulated from the polling may be considered by logic comparisons in the computer 22 to select the subset of persons who should be isolated.

In addition to the self-generating conclusions available from the received data, the system may involve the introduction of external data. With the physical fitness example, such external data might take the form of national statistical data. In any event, the processing operation usually involves comparison testing which compares caller data from individual memory cells of the processors PR1-PRn (FIGURE 1) with test data that is supplied through the command terminal CT.

With the above example, members of the public in general were invited to use the service. A number of alternatives exist which might well impact on the statistical analysis. For example, a list may be preserved by a use-rate calculator to implement a consumable key operation. That is, a user is qualified to a specific limited number of uses during a defined interval.

Considering another example, callers might be restricted to the purchasers of a specific product, such as a medical apparatus for measuring blood pressure, heart rate, etc. In such situations, it will be apparent that the statistical data will be somewhat distorted from an average or normal sampling. Clearly, the processors PR1-PRn can be programmed to take into account such considerations. In that regard, the processors might also verify identification data proffered by a caller. Such data might take the form of a credit card number or a personal identification number. Methods for verification of such numbers using computer techniques are discussed below.

As indicated above, the system can be programmed or formatted for use in a variety of applications. Before considering further examples in this regard, however, reference will now be made to FIGURE 4 showing an exemplary structural form for the processors PR1-PRn.

Referring to FIGURE 4, a pair of communication lines 90 and 91 connect with the switch 21 of FIGURE 1. The line 90 supplies signals to the switch 21 from a processing unit 92, whereas the line 91 supplies signals from the switch 21 to the processing unit 92.

The processing unit 92 may take the form of a mini-computer programmed to accommodate the functions of various applications, as disclosed in detail below. Furthermore, the system may utilize a plurality of independent function units or processing units, e.g., processing unit 92, operating in a somewhat parallel configuration, or alternatively, a

limited number of processors may be driven sequentially to accommodate the functional operations described.

Signals supplied to the processor 92 via the input line 91 are also supplied to a qualification unit 93, a sequencer 94 and a designation unit 96. The qualification unit 93 qualifies access from a remote terminal T1-Tn to the processing unit 92. Indeed, according to various applications or operating formats, the sequencer 94 and the designation unit 96, like the qualification unit 93, operate preliminarily with respect to individual callers. Generally, these units qualify or test callers for entitlement, develop a sequence-of-calls record and provide forms of designations for callers that may be authenticated. As described in detail below, the units function in sequence to accomplish such operations and accordingly are each individually connected to the processing unit 92 and buffer storage 97 (the buffer storage 97 is illustrated separately from the processing unit 92 along with the unit 93, sequencer 94, unit 96, and other units, in order to facilitate understanding).

The processing unit 92 is also connected to a memory 98 having memory cells C1 to Cn, and the qualification unit 93 to a look-up table 99 and a use-rate calculator 100. Additionally, the designation unit 96 is connected to a random-number generator 101 and an encryptor 102, and the processing unit 92 to a look-up table 103 and a clock 105.

In view of the above structural description of the system, consideration will now be given to certain specific applications. More especially, its operation in regard to automation of mail-order will next be described.

Assume that a caller at a terminal T1 (FIGURE 1) dials a specific number to identify a mail-order interface with the system of FIGURE 1. For example, assume the telephone number "(213) 627-4444" for such an interface, and that the caller dials this number at the remote terminal T1. As a result, communication facility C couples the terminal T1 via the automatic call distributor AC1, the interface 20 and the switch 21 to a select processor PR1 identified and programmed for a mail-order operating format. The communication facility C provides the dialled number, "(213) 627-4444", to the processing system P1 through the DNIS equipment. Accordingly, a program is selected to activate the mail-order interface.

As a preliminary action, a voice responder in the interface 20 might be cued by the processing unit to identify the mail-order house and indicate that the order will be taken by computer. Either before or after qualification, the caller might be advised that if he prefers to communicate directly with a person, or needs such contact at any point

in the communication, he may accomplish it simply by pushing the asterisk button (*) at the terminal T1. Such action forms an abort signal that is detected by the processing unit 92 to transfer the communication to the interface terminal IT (FIGURE 1). Alternatively, the customer may be asked (by voice cue) to provide detailed information as name, address, etc. which is recorded for later processing.

After the preliminary information is supplied to a caller, the qualification phase is initiated. For example, the interface 20 might actuate the terminal T1 to announce: "Please indicate the type of credit card you will use for your purchase by pushing the button number 'one' for Mastercharge, 'two' for"

The caller's response, indicating a specific credit card, will be stored in a data cell; however, the data is developed initially in the buffer 97. The format and data for the present example (in the buffer 97) will be explained with reference to a storage block format 104 as illustrated in FIGURE 5. The first data block 130 accordingly registers a digit to indicate the card that will be used to support payment for the caller's purchase.

Using voice prompt, the interface 20 next instructs the caller to use the telephone buttons to indicate his credit card number and the expiration date of the card. That data is stored in the register 104, specifically in the blocks 132 and 134 as illustrated in FIGURE 5.

Next, the caller is asked for his customer number, for example as it appears on his copy of the mail-order catalogue. The entered number is stored in the system in a block 136 of the block format register 104 along with his credit card number and the card-expiration date. However, it is possible that the caller is not already identified in the files of the mail-order house, and in that event, the operation may be shifted to a manual operation to be continued through the interface terminal IT (FIGURE 1). For a television-initiated mail-order transaction, other numerical codes might be employed in order to key into broadcast schedules. By way of example in the latter respect, a code might be used to indicate program times so as thereby to enable the productivity of such program times to be evaluated; such operation may be performed during the designation phase described below.

Continuing with explanation of the automated format, and assuming that the customer responds to the request for entry of his customer number, that number, together with the credit card number and expiration date as entered in the register 104, is checked by the qualification unit 93 (FIGURE 4), as part of the test or qualification phase of operation. The check or test is in two stages and both

are performed during an interval designated t1, the qualification unit 93 operating under control of the processing unit 92.

First, the data is verified as representing valid and proper data formats for the customer's number, the credit card number and expiration date. The second operation involves consulting a so-called negative list to assure that the identified card and customer's number have not been cancelled, as for example in the case of credit cards that have been lost or stolen. Detailed structure for such tests may be readily incorporated in the qualification unit 93.

With successful completion and verification of the preliminary data in the block format register 104, the qualification phase of operation is concluded and the system next interfaces with the caller to acquire and process data for a specific order of merchandise. Note that in the mail-order operating format, the sequence of the call is not normally significant. However, the sequencer 94 may log the time during a period t2 if this is desired.

Somewhat as described above in relation to the initial operating format (health poll), the voice generator in the interface 20 prompts the caller through a series of exchanges that load the storage block format register 104 with a merchandise order. Thus, as purchase items are confirmed, the register 104 is loaded as exemplified by the blocks 140 and 142.

For example, the interchange might proceed with the voice generator instructing the customer: "Please use the telephone number buttons to enter the item number of your purchase." The caller might then enter the number "1124" which would be set into buffer storage and supplied to address a look-up table. In response, the look-up table would cue the voice generator to announce: "That is item number 1124, a small white men's polo slipover cotton shirt at \$11.95. If that is correct, please push button one on your telephone. If it is not correct, push button two and re-enter the item number."

The choice of colour, size etc could be made as a separate step in the selection process, but at each step announcement is made of what has been selected and the caller requested to confirm or reject it. As the selection of items is confirmed, so the relevant data is loaded into appropriate memory blocks, such as blocks 140 and 142, of the register 104, and the caller asked to indicate whether or not he wishes to order additional items. According to his response, so the item-ordering process is repeated or terminated.

Provision is made for the customer to abort use of the mechanical interface at any time and transfer to personal communication with an oper-

ator at an appropriate interface terminal IT (FIGURE 1). Also, some operating formats might automatically make the transfer, such as where the callers ask for help, or complex data, such as names and addresses, is to be registered.

Once the item-ordering stage is completed the system operates the designation unit 96 (FIGURE 4) during the interval t3, to develop and announce the acknowledgement digits as stored in the block 144 (FIGURE 5). The acknowledgement digits serve to identify the order both for the caller and the mail-order house, and enable the order to be readily traced. The data (FIGURE 5) is then transferred from the buffer 97 (FIGURE 4) to a select memory cell C1-Cn.

During the next interval, t4, the processing unit 92 (FIGURE 4) isolates data of the cells C1-Cn to facilitate the mail-order process. In that regard, the processing unit 92 incorporates provision for statistical analysis according to a program that accumulates totals of specific items, which are then utilized for inventory control. Specifically, comparisons can be performed between order totals, and objective and existing inventories to generate lists for inventory adjustment. Thus, the system effectively analyzes acquired data to accomplish the desired objectives.

The processing unit 92 is also operative to isolate subsets of order data; this is helpful in organizing shipments but also in avoiding fraud. Where, for example, a number of credit cards have been acquired for fraudulent purposes, these might well be used for a short period of time to support shipments of a large volume of orders to the same destination. Consequently, identification of a major subset of merchandise-order data designating similar shipping destination, can be used to prompt fraud investigation.

Of the wide variety of other operating formats and applications in accordance herewith, further examples will now be described with reference to the systems of FIGURES 1 and 4. However, from a consideration of the operating formats treated below, it will be apparent that certain structural elements have recurring significance in the combination. Specifically, such elements include the structures: (1) utilizing the called number to select a specific operating format, (2) for screening or selecting callers who will be accepted based on various criteria, (3) for designating callers in a manner to enable subsequent positive identification, and (4) various processing aspects of the data manipulations including the provision of at least a portion of certain ID data provided directly from the telephone apparatus. With respect to the data processing, distinctive elemental features include the utilization of external data not available during the interval of gathering data, the utilization of an interrelationship

between the composite data collected during a data acquisition period, and the operation of utilizing time or sequence of callers to accomplish a subset.

As the next illustrative operating format, an instant lottery system will be described. Accordingly, assume the existence of a legalized state lottery accommodated by the telephone system utilizing a pay-to-dial number ("(213) 976-xxxx") and restricted to a limited number of uses for defined intervals of time. For example, a person might be entitled to play the lottery a limited number of times or to the extent of a limited dollar value during a predetermined interval.

From the terminal T1 (FIGURE 1) the caller would actuate the push buttons 14 to establish contact with the processing system P1; coupling would be through the communication facility C, the automatic call distributor AC1, the interface 20 and the switch 21 as described in detail above. The initial operation then involves qualification of the caller to participate in the instant winner lottery. Again, ANI or caller interface techniques may be employed, but if the caller is involved, the interface 20 is actuated by the qualification unit 93 during the operating interval t1 to instruct the caller: "Please key in your telephone calling number".

After the caller's telephone number is registered, whether this is derived from ANI equipment or from prompted-entry by the caller, the instruction is given: "Participation in instant winner lottery is for persons over twenty-one years of age. Accordingly, please key in the year of your birth". A driver's license or credit card number may be registered similarly, to confirm age. Alternatively, the combination of telephone number and date of birth could be used. In any event, the caller's data is registered and the qualification unit 93 then functions to test the data as provided. Specifically, the caller's telephone number is checked in a look-up table 99 to determine whether or not it is a proper and currently valid number for use in the lottery. Concurrently, the number is checked by the use-rate calculator to determine the number of times it has been used in excess of a predetermined number of calls or dollar value to participate in the lottery during a current interval of monitoring.

If the data indicates a qualified caller, the system proceeds to the next phase of designating the transaction. The sequence is not significant in this operating format with the consequence that the interval t2 and the operation of the sequencer 94 may be bypassed. Rather, the designation unit 96 operates during the interval t3 to provide the caller with a designation for the current transaction and, if applicable, updates the file as to current use or dollar value remaining for the caller's use. As explained above, the random generator 101, with or

without the encryptor 102, may be employed to create an identification number which includes an encrypted form of the caller's telephone number. Accordingly, data for the transaction is established in the buffer 97 then set in a cell of the memory 98 (FIGURE 4). Specifically, the completed data cell format might be as follows:

Telephone No. - Birth Year - Designation - Random No.

The system next functions to generate the random number as indicated above which will then be tested against a series of other numbers to determine whether or not the caller is a winner. In that regard, elements in the processing unit 92 which accomplish the operation are illustrated in FIGURE 6 which will now be considered in detail.

Referring to FIGURE 6, a random number generator 160 functions on command to provide a three-digit number. With the consummation of a call, the random number generator 160 is actuated to provide the caller's random number in a selected caller cell 162. From that location, the caller's random number is compared by a comparator 166 with numbers from a register 164. The numbers in the register 164 were previously passed through a gate 174 from the generator 160. In the event of coincidence, the comparator provides an output "yes" signal to a line 168. Conversely, the failure of coincidence prompts the comparator 166 to provide a "no" output to a line 170. Essentially, a "yes" indicates a win while a "no" indicates the caller has lost.

The elements of FIGURE 6 provide a random operating format to determine winners on a somewhat statistical basis; however, the system increases the probability with the passage of time when no win occurs. In that regard, at the outset of an operating cycle, the random number generator 160 provides a random number that is passed through the gate 174 to the register 164. In the exemplary format, a three-digit number would be provided. At that stage, the caller's random number, from the cell 162, would be compared with the single number in the register 164 by the comparator 166. However, with the passage of time, calls are tallied or time is metered by a counter 178. Accordingly, upon the attainment of a predetermined count, the gate 174 is again qualified to enter another number in the register 164. Accordingly, an increasing set of numbers are held in the register 164 for comparison with each caller's number. Of course, the more numbers in the register 164, the higher probability of a caller winning and that relationship depends upon the duration or number of calls since the last winner.

Whether a win or a loss is indicated within the processing unit 92 (FIGURE 4), the interface 20 is prompted to respond appropriately to the caller and

announce the result. If there is a win, the designation may be reinforced and additional identification may be taken as explained above. Of course, if the prize simply involves credit to be applied to the caller's telephone bill or his credit account, identification and designation become less critical considerations.

In the event of substantial awards to be claimed, the processing system P1 (FIGURE 1) may actuate the printer PR to provide hard-copy, positive identification of the winner. The document produced may be redeemed only by the caller providing the assigned designation along with confirmation of his identification data.

Generally in relation to awards, the processing unit 92 (FIGURE 4) may also utilize a random number format for determining the significance of awards. That is, a random number may be actuated to provide numerals from one through twenty, for example, the magnitude of the number generated for a caller indicating the significance of his award. Normally such information would be provided to the caller and registered in his memory cell.

With respect to memory cells generally, it is to be noted that actuated memory cells may be cleared for callers who are not winners. Accordingly, a limited number of memory cells store the subset of winners for subsequent confirmation processing and so on.

As another operating process format in accordance with the present invention, consider an auction sale. As disclosed herein, the auction format is associated with television as, for example, in the form of a cable channel for dedicated use during an interval of an auction sale. Persons wishing to participate in the auction sale would make preliminary arrangements involving utilization of the system to establish authorization data for qualified bidders in cells C1-Cn of the memory 98 (FIGURE 4). In an alternative format, the bidders could simply be qualified immediately before bidding, as on the basis of a charge-card number or other identification.

Generally, it is contemplated that callers are coupled into the system only during the bidding on specific items of merchandise. Accordingly, some pre-qualification may be desirable to facilitate the rapid accumulation of a bidding group with the introduction of a unit of merchandise.

In accordance with this format, an auctioneer conducts the sale in a somewhat traditional manner, recognizing that he is interfacing a relatively large audience through the system of the present invention and with a television connection. Specifically, the auctioneer is cued as to audience reaction by a monitor incorporated in the command computer terminal CT (FIGURE 1). Essentially, the

auctioneer is given an abstract or summary of the relative bidding as the auction progresses. In one format, the caller sees the auction on a television receiver; the monitor may be covered by a television camera to inform the audience and particularly interested bidders.

As the auctioneer announces the next item for sale, it is televised to potentially interested bidders. In addition to being informed of the merchandise, potential bidders might also be reminded of the telephone number for participating in the auction. Accordingly, any interested person at a remote terminal T1-Tn may dial the auction number and obtain access to the processing systems P1-Pn. The caller would have a television set available, tuned for example to a cable channel.

Any preliminary qualification as indicated above, will then be performed along with any appropriate designation. Unless the callers have been identified as part of the qualification step, the designation unit 96 (FIGURE 4) assigns a limited-digit number to individual callers for use by the auctioneer interfacing the command computer and terminal CT.

Further designation and sequencing as disclosed herein also constitute part of the process. To the extent that qualification and designation operations may be performed, the operations are performed as described above with reference to FIGURE 4 by the qualification unit 93 and the designation unit 96. Of course, any of the safeguards and limitations as described herein may be employed as deemed appropriate for an auction format.

After the preliminaries, the auctioneer initiates the bidding with respect to a particular item that is observed by callers on television receivers, for example via a cable channel. The audio may be variously coordinated through the telephone communication facility C and the audio channel of the caller's television. In a simple format, after an introductory phase, communication to callers with respect to the bidding is provided through the television link. Alternatively, the audio unit AD (FIGURE 1) may be employed.

Essentially, the auctioneer initiates the bidding by stating an initial value for the opening bid. Callers are invited to bid by actuating the push buttons 14 (FIGURE 1). For example, the auctioneer may invite an initial bid of one hundred dollars asking callers to so bid by entering an asterisk (*) by punching the button so designated. In accordance with one operating format, cells in the memory 98 (FIGURE 4) are actuated to register the bidding number in identified relationship with several calls. Note that although a record may be desirable, it is not usually necessary to record all bids, particularly at initial bidding figures. In any

event, individual processing units, e.g. unit 92 in individual processors PR1-PRn, are interconnected (FIGURE 1) and operate to select the final and key bids.

After the initial bid, the auctioneer may invite further bidding by seeking a bid of two hundred dollars or any bid. Such a bid might be accomplished either by punching the asterisk button to attain the solicited bid, or by using number buttons to enter a different bid, e.g. two hundred fifty by buttons "2", "5" and "0". Again, calls of the memory 98 are actuated to record select bids (sequence) at the higher value.

The status of the bidding is presented to the auctioneer by the monitor of the command computer terminal CT (FIGURE 1). Specifically, the auctioneer is provided an indication of the number of bidders at each level. If a sizeable number of callers bid at a specific value, the auctioneer may wish to advance the price significantly for the next round of bidding. Thus, the auctioneer proceeds until a small group of remaining callers are addressed. The display of the command terminal CT (FIGURE 1) may also inform the auctioneer of fresh bidders.

As the selection process proceeds, signals from the clock CL (FIGURE 1) are introduced to indicate the sequence of bidders. For example, assume the bidding has proceeded to a stage where only three bidders remain active. The auctioneer is informed by the command terminal CT of the order in which the callers made their bids. The sequence is also of record in the cells of the memory 98 (FIGURE 4) to indicate the sequence in the event that the final bid involves more than one caller. Of course, the first caller to respond with a bid would have priority in the purchase.

Normally at the conclusion of the bidding on a particular item, the contents of the cells in the memory 98 would be purged with only the final bidders being held in general memory within the processing unit 92. Of course, it is important to maintain a record of back-up bidders in the event the sale is not consummated with respect to the first of the highest bidders. That is, a subset of the highest bidders is preserved for each item of merchandise in the event that the highest bidder fails to qualify or the sale otherwise cannot be consummated. A distinct advantage of the system is the ability to accommodate a vast auction participation group for items of substantial value and as a consequence the distillation of a subset of callers is exceedingly valuable information.

To consider another operating format in association with the television media, a system will now be described whereby television viewers participate on a real-time basis in a game show for prizes. The ability to involve television viewers in a program

has the potential of expanding program interest along with the expanded participation.

Game shows in accordance herewith may take any of a wide variety of forms as several well known programs in which studio contestants compete for prizes. In utilizing the system of the present invention to involve remote participants, it may be desirable preliminarily to qualify and designate callers as explained above. Specifically, prior to participating in an actual game show, interested participants interface the system as depicted in FIGURE 1, and in the course of an exchange as described above, the qualification unit 93 and the designation unit 96 cooperate with the processing unit 92 to accomplish preliminary data on potential participants in cells of the memory 96.

Various games will involve different screening processes and clearances. For example, a child's television game format may require parental clearance and in that regard written communication may be required for approvals. Such approval may require the assignment of a personal identification number to the child player as qualifying identification data.

As explained above, clearances may be perfected through the look-up table 99 (FIGURE 4) in association with the qualification unit 93 or approvals through a consumable key step may be extended to incorporate functions of the processing unit 92 in association with the memory 98. For example, if qualification simply involves a check-off operation, the look-up table 99 will normally be employed. However, in the case of preregistration for a participant, as in the case of the auction sale, the memory 98 is involved with the qualification unit 93 through the processing unit 92 to establish a data cell C1-Cn for each qualified participant. Thus, each potential participant to be qualified interfaces with the processing unit 92 during a preliminary interval of operation to provide data in one of the cells C1-CN to facilitate qualification for participation during a real-time game show.

At the time of the show, callers are qualified simply by reference to their assigned memory cell data for a verification. Thereafter, the caller's exchange information to supplement their data as with respect to the play which follows. Specifically for example, a caller might select a studio audience participant with whom the caller is to be allied. The interface operation may be essentially as described above wherein a voice generator in the interface 20 (FIGURE 1) provides signals which activate the remote telephone unit to speak the instruction: "If you wish to play with Player No. 1, please push button No. 1; if you wish to play with Player No. 2, please push button No. 2 and so on". The caller may also be instructed to indicate the extent of a wager. For example, "Push the number button in-

dicating the points you wish to risk".

The participant data is stored in an assigned cell of the memory 98 (FIGURE 4) for the caller and as the game proceeds, the processing unit 92 tallies the caller's score. Scores are interrelated between individual processing units to actuate the terminal CT. Thus, individual accounting occurs for each of the calling participants on an on-line basis dependent upon the success of the studio players and their association with the callers. On-going accounting data may be provided at intervals or real time by the recorded voice to each contestant.

According to the described format, after an interval of play, the processing units, as the unit 92 (FIGURE 4), operate to isolate a subset of caller-players who have amassed the highest scores. Of course, various arrangements may be provided for awarding prizes to the select subset of winning callers.

The above format involves a real-time game show with an on-line operating format. A somewhat similar format involves nonreal-time operation and in that sense, callers may interface with the system of the present invention before and after the show; however, not primarily during the show. Such a show might involve a quiz for callers based on their ability to perceive and remember occurrences within the show. Preregistration may be employed, however, is not essential. Rather, callers may call after the broadcast of a program. In that event, sequence or time clocking may be very important to limit or control individual interfaces to a specific time or geographic "window". That is, as suggested above, allocation-routing equipment and techniques may be employed in various of the formats to window callers. With the system, callers are screened or qualified at the time of a call, identified in a particular calling sequence, designated for identification and quiz answers are given for subsequent processing. Alternatively, players could participate by providing their credit card for billing or be billed through the "pay-to-dial" network.

A key to participation in the game show may involve the purchase of a particular product. For example, a person desiring to participate may purchase a product which carries a concealed key number. The number serves as a caller's key to participation in the game show.

In accordance with the disclosed operating format, after watching the broadcast of a television show (possibly a serial episode) the participant actuates the push buttons 14 at one of the remote terminals T1-Tn to accomplish an interface communication with the select operating format. For example, the caller may actuate the buttons 14 for the station number "277-7777" which identifies the game format of current description.

Assuming that there is responsive operation of the communication facility C to couple the caller through the automatic call distributor AC1 to the interface 20, the interface 20 receives the caller's telephone number through ANI equipment, and a data cell in the memory 98 (FIGURE 4) is assigned to the caller. Specifically, for example, associative coupling is provided for the caller through the switch 21 (FIGURE 1) to the processor PR1 containing the memory 98 (FIGURE 4) and a cell C2 assigned to the caller. A block format 200 is illustrated in FIGURE 7 indicating the data that is developed in the cell C2. At the outset, the caller's telephone number is stored in a section 201 followed by uses/month in section 202.

Next, the caller is greeted and requested to give the key number entitling him to participate in the game show. The instruction constitutes an initial action to take place in an interval of qualification during the time t1. The caller actuates the buttons 14 providing digital signals to the qualification unit 93 (FIGURE 4) and the look-up table 99 is consulted. The table 99 may be a large, shared unit that tabulates each of the key numbers and accounts for their use. If the caller has identified a proper key number, the process proceeds and the key number is accounted, i.e. incremented or decremented to the limit of use if any. Alternatively, a repeat information operation may be requested as described in detail above.

As a further check during the qualification stage, the use-rate calculator 100 may function to determine whether or not an excessive number of calls have originated from the designated number. Thus, consideration involves calls or value with reference to a predetermined period of time. Again, a shared calculator may be used or addressing may obtain selectivity on the basis of calling numbers. If a large number of calls have originated from a single telephone terminal, a fraudulent situation may be suggested. Assuming no such indication occurs, the number of uses is registered in a section 200 (FIGURE 7) and the operation proceeds from the interval t1 to interval t2.

During the interval t2, the sequencer 94 registers the precise time of the call in the buffer storage 97, specifically in a section 204 as shown in FIGURE 7. With the entry of such data, the system passes from the operating interval t2 to t3.

The caller is next asked to identify himself in some specific manner. For example, the caller may simply be asked to provide the year of his birth. Alternatively, somewhat comprehensive information may be taken as in the form of drivers' license numbers, social security numbers and so on. Of course, such data may be employed for subsequent identification of the caller and, accordingly, is registered in the buffer storage 97 (FIGURE 4).

Specifically, identification information is registered in section 206 of the block 200 as shown in FIGURE 7.

In addition to receiving identification information from a caller, the system assigns a designation to the caller. In this regard, the random number generator 101 (FIGURE 4) provides a number which may be encrypted along with other identification data as the caller's personal identification to provide a numerical designation that is registered in the storage 97. Specifically, the designation is stored in a section 208 as illustrated in FIGURE 7. With the designation operation complete, the interval t3 terminates initiating the data accumulation phase which occurs during an operating interval t4.

At this juncture, operating elements within the processing unit 92 and associated with the memory 98 in FIGURE 4, will be considered in relation to an explanation of the manner in which select questions are provided to a caller and his answers received and recorded for subsequent processing to determine winners. These elements are illustrated in FIGURE 8.

In order to accommodate the exemplary operating format, a dramatic program might be recorded preparatory to the television broadcast. A substantial number of questions would then be formulated based on the dramatic program. For example, "How many people were present when the will was read?"

It is contemplated that the dramatic program would be broadcast to different geographical segments of the country during different time intervals. To accommodate the different time intervals, it is proposed to utilize different questions for each geographic segment. That is, the basic format can remain the same, only the questions change by time zone to avoid study and collaboration on questions as a result of time shifts. A question propounded to a Chicago caller should not be repeated to a Los Angeles caller. In any event, callers might be given three questions randomly drawn from a pool serving one geographic segment and three questions drawn from a different pool serving another geographic segment.

Referring to FIGURE 8, the signals for prompting a voice generator are registered in memory sections MS1 to MSn. Each of the memory sections MS1-MSn is served by an address input AI1-AIn respectively. Similarly, the address inputs AI1-AIn are instructed by random number generators NG1-NGn, in turn actuated by decoders DE1-DEn. The operating sequence of the memory MS1 will be considered as an example.

The decoder DE1 is responsive to telephone calling numbers (provided by ANI equipment) indicative of a particular geographic area. The area

code numbers afford an effective geographic classification of callers which is very useful in many formats or processes of statistical analysis in accordance herewith. Geographic (or other) classification in accordance herewith is also accomplished by the called numbers provided. Each of several television stations would solicit calls for different numbers as a result, either by DNIS or call channelling. Select processors would be reached through the interface units, e.g. interface 20 of FIGURE 1. In operation, the decoder DE1 determines a call is from a specific geographic area and accordingly provides a signal to actuate the random number generator NG1. As a consequence, the random number generator NG1 provides a series of three random numbers in the form of addresses for the memory MS1. That is, the addresses may simply comprise three alphanumeric bits supplied to the address input AI1 to prompt the provision of three sets of voice generator signals for announcing the three questions in sequence. For example, the first question might be as suggested above: "Push the button on your telephone for the number of persons present in the room when the will was read".

The voice-generator signals are supplied from the memory MS1 (within the processing unit 92, FIGURE 4) to the interface 20 (FIGURE 1) which generates audio signals to actuate the caller's hand-piece 10. Accordingly, the caller is instructed to answer three questions, the responses being recorded in a section 210 of the data block 200 (FIGURE 7). The clock 105 (FIGURE 4) may be utilized to limit the response period allowed each caller.

As indicated above, to accommodate broadcast of the program in a different time slot for a different geographic area, the decoder DE_n (FIGURE 8) actuates the random number generator NG_n to address the memory MS_n to provide three different questions as a result of a random selection. Accordingly, within a time or times (perhaps limited and offset) after the conclusion of the program, a substantial number of callers are accounted for in cells of the memory 98 and similar units of the composite system. The cells indicate sequences of calling and also may contain billing data where appropriate. That is, pay-to-dial operations avoid the need for billing, yet it may still be made of record.

Subsequent to the data accumulation phase of operation, the processing unit 92 (and its equivalents) is actuated during an off-line processing interval to isolate the subset of callers correctly responding to the questions. In accordance with one format, the subset of successful callers may be reduced to a sub-subset as by a random computer "draw" to define a group of significant win-

ners. That is, a random number generator may be employed as explained above.

As an alternative to subsequent processing, the system may inform callers of their success during the course of the interface telephone call. That is, callers might simply be informed by cueing the voice generator: "Your answers are correct and in accordance with the program game, you will now be entered in the sweepstakes draw for the prize" Thus, the format defines a subset and then further selects a sub-subset of winners. In any of the various formats, the status of the analysis can be televised by selecting a camera focused on the interface terminal IT.

Still another operating format for the system takes the form of polling operations to determine opinion or facts. An illustrative form of the format is disclosed below again in association with a television broadcast.

Generally, the illustrative polling format is contemplated in association with a television broadcast addressing a matter of current interest as, for example, a political issue or election. A master of ceremonies propounds questions to a viewing audience, many of whom are on-line through an interface of a system of the present invention. The master of ceremonies or commentator instructs the callers who are regulated and controlled by the system of the present invention to provide digital data which the system processes to inform the commentator as with regard to subsets of callers. For example, the commentator may be statistically informed as to the numbers of callers holding specific views.

By way of example, assume the existence of a system in accordance with the present invention installed for use in association with a television broadcasting facility. Of course, various previous arrangements could be involved; however, according to one arrangement a commentator simply invites members of the viewing audience to call a specific number and express their views with respect to a specific issue. Callers located at terminals T1-Tn (FIGURE 1) activate the terminals to accomplish an interface with one of the processing systems P1-Pn as explained above. Note that the processor (or the interface 20 may involve operation of the qualification unit 93 (FIGURE 4) to prevent callers from loading the poll. That is, to prevent multiple calls from a single terminal that would distort a poll, the qualification unit 93 registers calls in association with the use-rate calculator 100. Interfacing a specific processor, callers are screened by the qualification unit 93 (FIGURE 4). In such a poll, it may be important to control the sampling group on a statistical basis. For example, it may be desirable to limit callers from each of several geographic areas. Accordingly, by the use

of ANI equipment, the caller's telephone number is provided to the qualification unit 93 during the preliminary interval t1, and a determination is performed with regard to the number of involved callers from the geographic area using the look-up table 99. On attaining a full quota from a specific area, a subsequent caller may be informed that the lines are full. Alternatively, the caller may be requested to provide his telephone number for screening in the event ANI equipment is not available.

The caller may be requested to provide additional information so as to poll a balanced group. For example, a caller might be asked questions concerning age, political registration and so on by prompting the interface unit 20 to pose audio questions and testing the digital results through the qualification unit 93 as with reference to the look-up table 99.

As indicated above, in the event that the broadcast television program is one of a series, it may be desirable to limit the extent of participation over a period of several programs. Accordingly, the use-rate calculator 100 (FIGURE 4) may be employed in association with the qualification unit 93. That is, if a calling number has participated in a prior poll, it may be denied access for a subsequent poll or its data not counted. Such operation would involve the use-rate calculator 100 in association with the qualification unit 93 performing logic tests to actuate the voice generator of the interface 20 for providing an appropriate interchange with a caller.

With the screening or qualification of a select group of callers, the sequencer 94 (FIGURE 4) may, or may not, be involved to identify the order of callers. Also, the designation unit 96 may, or may not, be involved in view of the fact that for many polls there is little interest in subsequently identifying callers.

In the poll-format operation of the system, it is important to provide a capability of defining select intervals during which callers may provide data. To this end, it may be arranged that with the consummation of a communication interface between a caller and a processor unit, the audio of the television broadcast is keyed from the audio unit AD through the switch 21 (FIGURE 1) for communication to the caller.

With a multiplicity of callers in interface relationship with the processors PR1-PRn as function units, a polling question is stated, for example: "If you favor expanded trade with ... at the tone press button one; if you do not, press button two".

In order to control the interval of polling, the command computer terminal CT (FIGURE 1) is actuated to enable the callers timely access to the processors. At the expiration of a polling interval, the interfaces may be terminated or additional

questions may be propounded. In any event, subsequent to the data-gathering phase, the bulk data is supplied to the command computer terminal CT incorporating computing facility to isolate subsets for communication by the broadcast. Accordingly, an effective on-line poll can be conducted with statistical sampling control and prompt display of responses.

As explained above, the arrangement of the function unit (or units) may be variously embodied in a single processor or many processors, depending on various considerations as time sharing, multiplexing, paralleling and so on. The systems as described above embody the components bulked together in one location. However, components of the system could be spaced apart geographically, using dedicated lines or polling techniques. An illustrative embodiment is shown in FIGURE 9.

Referring to FIGURE 9, call distributors CD1-CDn are at different geographic locations along with associated interface units IA1-IA_n and IB1-IB_n. Each of the interface units, as unit IA1 is coupled to a central processor 251 as indicated by lines 252, 254, 256 and 258. Each of the lines may take the form of a dedicated telephone line or a polling telephonic coupling.

In operation of the system of FIGURE 9, the call distributors CD are coupled to a telephonic communication system and accordingly allow the interface units I to provide interface communication between the central processing unit 251 and a multitude of remote terminals T1-T_n as illustrated in FIGURE 1. With data accumulated in the cells, it may be variously down loaded as to a central processing station. Thus, the distributed-component system is capable of executing the various formats as explained above with reference to the illustrative structure.

In view of the above explanation of exemplary systems, it will be appreciated that other embodiments of the present invention may be employed in many applications to accumulate statistical data, process such data, and define subsets of callers of concern.

Claims

1. A method of interactive call-handling in which calls from a multiplicity of terminals (T1-T_n) of a communication system (C) are received at a receiving station (D), automated voice responses to the calls are made from the receiving station (D) to the calling terminals (T1-T_n) prompting the callers to transmit digital-signal data to the receiving station (D) via the communication system (C), and digital-signal data transmitted via the communication system (C) by the individual callers in re-

sponse to the voice prompting is received at the receiving station (D), characterised in that the digital-signal data received at the receiving station (D) in respect of each individual call of a plurality of such calls, is stored (53, 58 Figure 2; 130-142 Figure 5; 206, 210 Figure 7) in relationship with other digital-signal data (62-66 Figure 2; 144 Figure 5; 201-204, 208 Figure 7) received or otherwise derived at the receiving station (D) in respect of that individual call, and that at least part of the data stored in respect of each of the plurality of calls (53 Figure 2; 130-134 Figure 5; 201-204 Figure 7) is for qualifying the caller in regard to the performance of a predetermined function for which the performance and/or outcome is dependent upon at least part of the data stored (58 Figure 2; 140-142 Figure 5; 210 Figure 7).

2. A method according to Claims 1 characterised in that different voice promptings are provided, and different functions are performed, according to the calling signals received at the receiving station (D) from the caller.

3. A method according to Claim 1 or Claim 2 characterised in that any one of a multiplicity of different processing formats are performed according to caller-selection, that performance of at least one of the processing formats when so selected includes initiation of a memory file individual to the caller (Figure 2; Figure 7), and that in this file there is stored data (62 Figure 2; 204 Figure 7) dependent on the timing or other sequence-order of the call in relation to other calls, and data (53, 58 Figure 2; 206, 210 Figure 7) dependent on the caller's response to voice prompting together with, or including, identification of the caller (53 Figure 2; 206 Figure 7).

4. A method according to any one of Claims 1 to 3 characterised in that at least part of data received from the caller or otherwise derived in respect of the call (208 Figure 7), is stored in encrypted form.

5. A method according to any one of Claims 1 to 4 characterised in that the said other digital-signal data is at least in part data (58 Figure 2; 140-142 Figure 5; 210 Figure 7) received at the receiving station (D) in response to further voice prompting of the caller during the call.

6. A method according to any one of Claims 1 to 5 characterised in that the step of qualifying each caller depends upon the caller signalling a key to the receiving station, and that the key is effective only once, or some other limited number of occasions, for qualification in regard to performance of said function.

7. A method according to any one of Claims 1 to 6 characterised in that at least part of the said other data stored in respect of each individual call includes data (62 Figure 2; 204 Figure 7) which is

derived in dependence upon the timing or other sequence-order of that call in relation to other calls received.

8. A method according to any one of Claims 1 to 7 characterised in that the receiving station (D) prompts the caller to signal back to the receiving station (D) digital data (66 Figure 2; 144 Figure 5) derived at the receiving station, and that the digital-signal data received from the caller in response to such prompting is checked at the receiving station (D) as part of the step of qualifying the callers.

9. A method according to any one of Claims 1 to 8 characterised in that the function performed includes analysis of data stored in respect of a multiplicity of calls to identify a subset of the callers.

10. A system for interactive-call handling in which calls from a multiplicity of terminals (T1-Tn) of a communication system (C) are received at a receiving (D) station of the system, automated voice responses to the calls are made from the receiving station (D) to the calling terminals prompting the callers to transmit digital-signal data to the receiving station (D) via the communication system (C), and digital-signal data transmitted via the communication system (C) by the individual callers in response to the voice prompting is received at the receiving station (D), characterised in that the receiving station (D) includes one or more data processing means (P1-Pn) that include memory (97, 98 Figure 4; MS1-MSn Figure 8) for storing digital-signal data received at the receiving station (D) in respect of each individual call of a plurality of such calls, that such data is stored (53, 58 Figure 2; 130-142 Figure 5; 206, 210 Figure 7) in the memory (97, 98; MS1-MSn) in relationship with other digital-signal data (62-66 Figure 2; 144 Figure 5; 201-204, 208 Figure 7) received or otherwise derived at the receiving station (D) in respect of that individual call, and that the processing means (P1-Pn) is operative to qualify the caller in regard to the performance of a predetermined function by the call-handling system, such qualification being made in accordance with at least part of the data stored in the memory (97, 98; MS1-MSn) in respect of the call (53 Figure 2; 130-134 Figure 5; 201-204 Figure 7), and that the performance and/or outcome of said function is dependent upon at least part of the data stored (58 Figure 2; 140-142 Figure 5; 210 Figure 7).

11. A system according to Claims 10 characterised in that different voice promptings are provided, and different functions are performed, according to the calling signals received at the receiving station (D) from the caller.

12. A system according to Claim 10 or Claim 11 characterised in that the one or more processing means (P1-Pn) are adapted to operate accord-

ing to a multiplicity of different processing formats, that selection of the processing format to be performed in respect of any call is dependent upon signals transmitted in, or otherwise derived from, that call.

13. A system according to Claim 12 characterised in that at least one of the processing formats includes, when selected, initiation of a memory file (C1-Cn Figure 4) individual to the caller and storage therein of data (62 Figure 2; 204 Figure 7) that is dependent on the timing or other sequence-order of the call in relation to other calls, and data (53, 58 Figure 2; 206, 210 Figure 7) dependent on the caller's response to voice prompting together with, or including, identification of the caller (53 Figure 2; 206 Figure 7).

14. A system according to any one of Claims 10 to 13 characterised in that encrypting means (102) encrypts at least part of data received from the caller or otherwise derived in respect of the call, and that the data as so encrypted is stored in relation to the call (208 Figure 7).

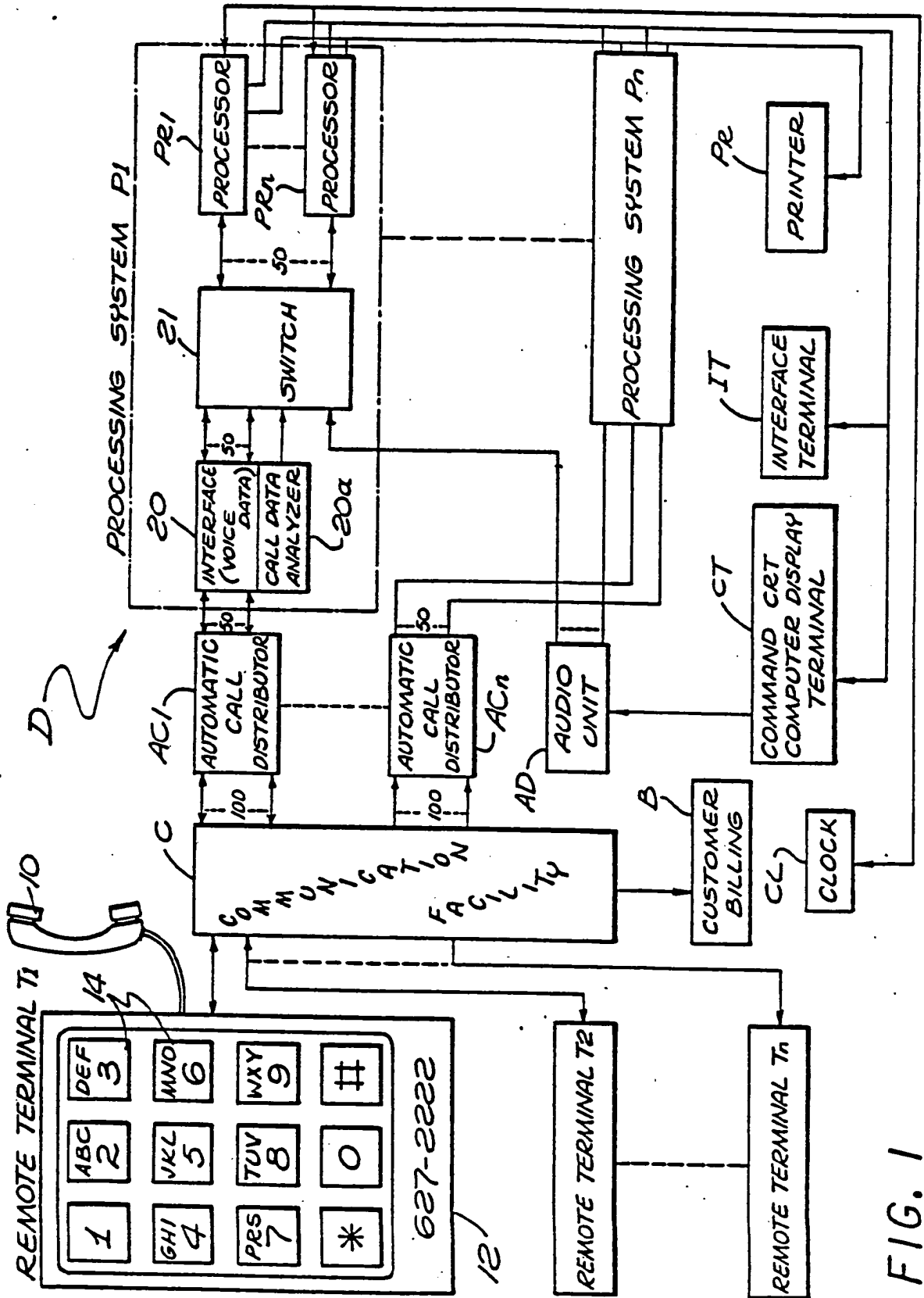


FIG. 1

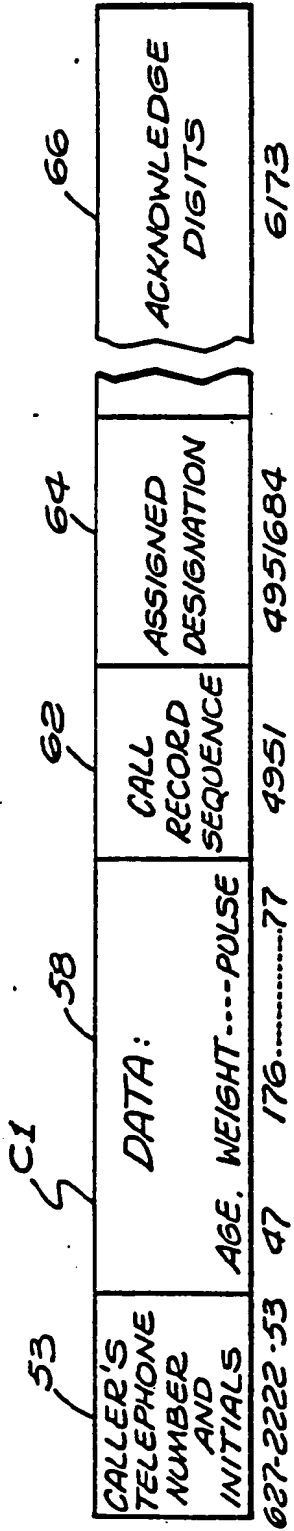


FIG. 2

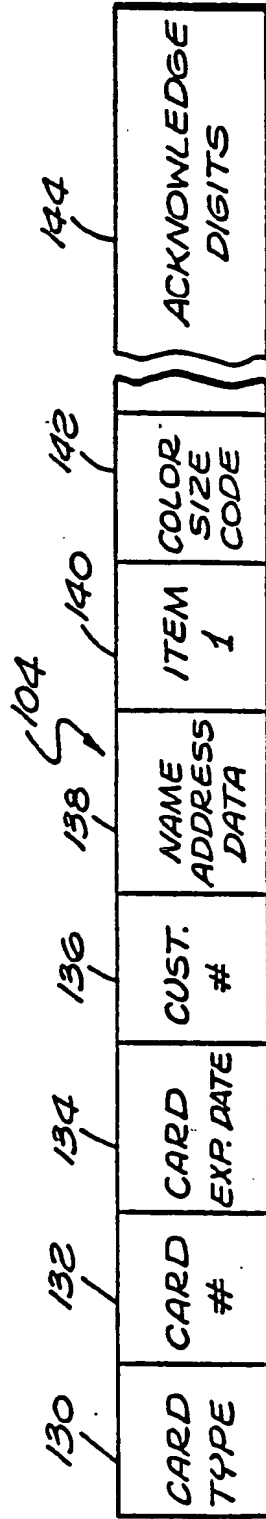


FIG. 5

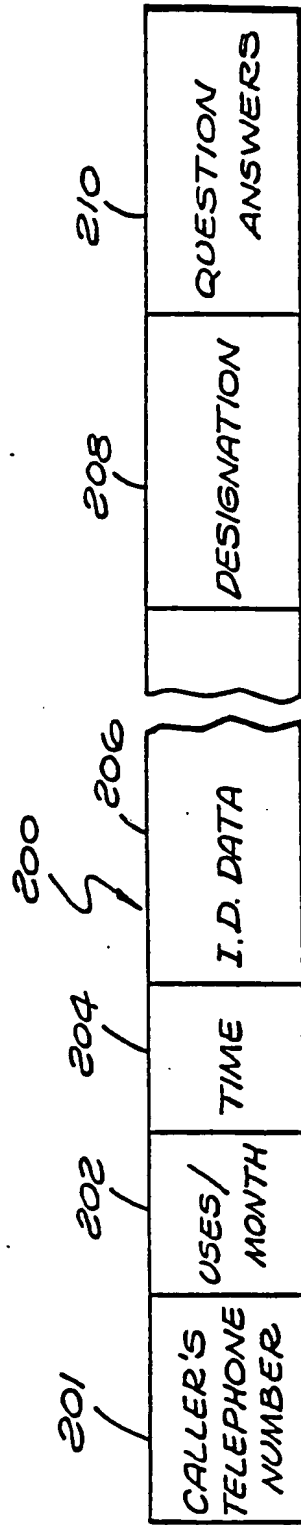


FIG. 7

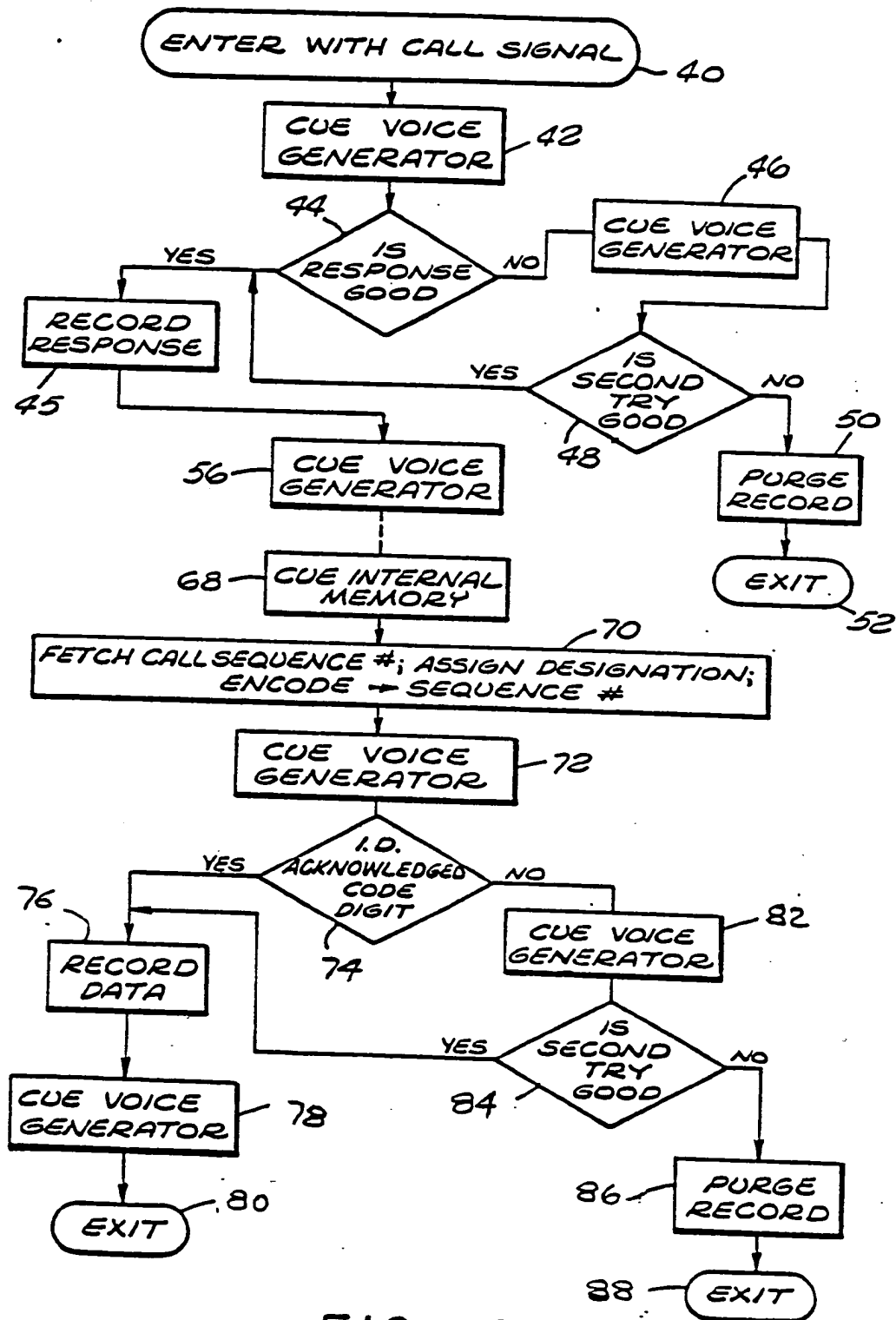


FIG. 3

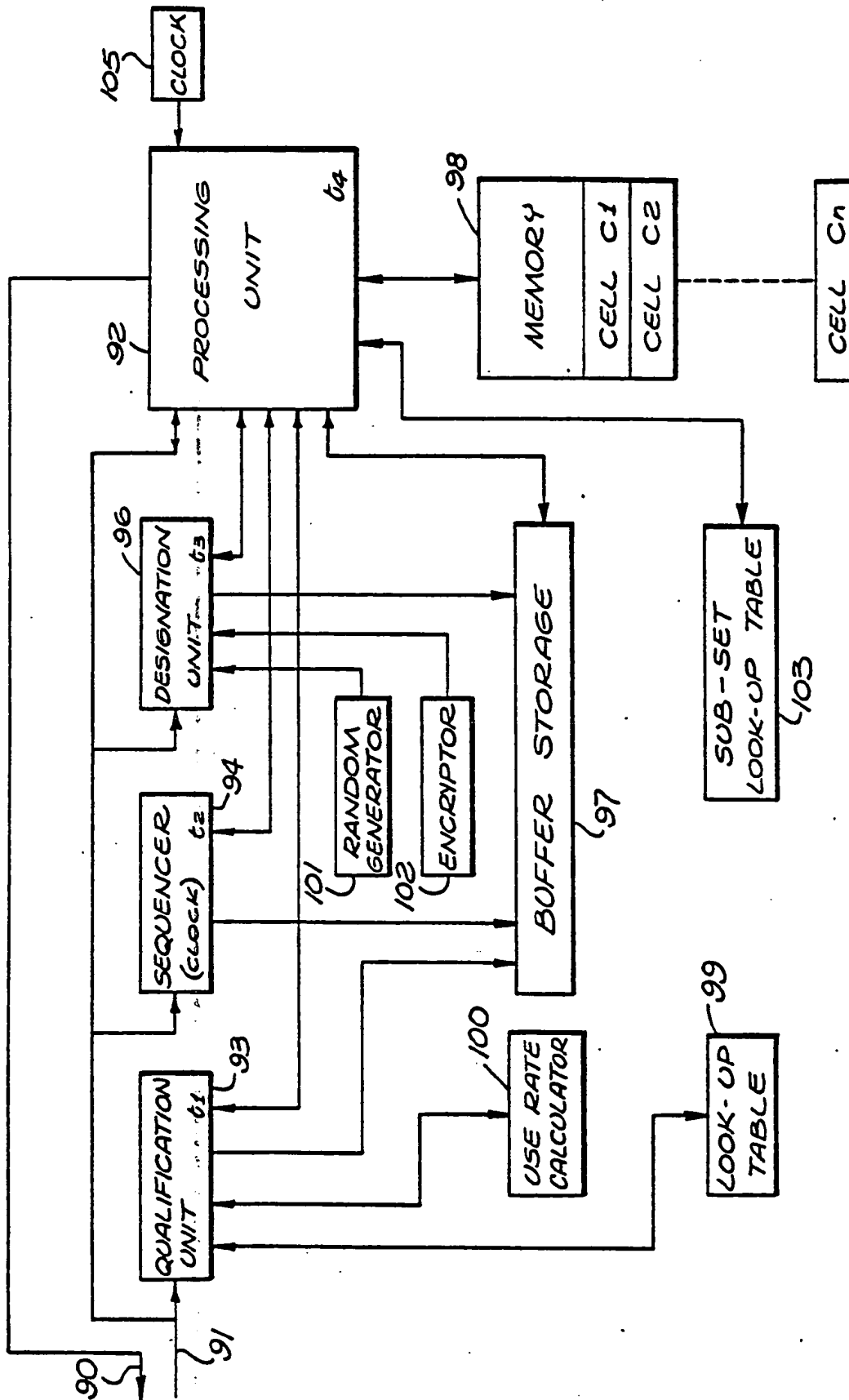


FIG. 4

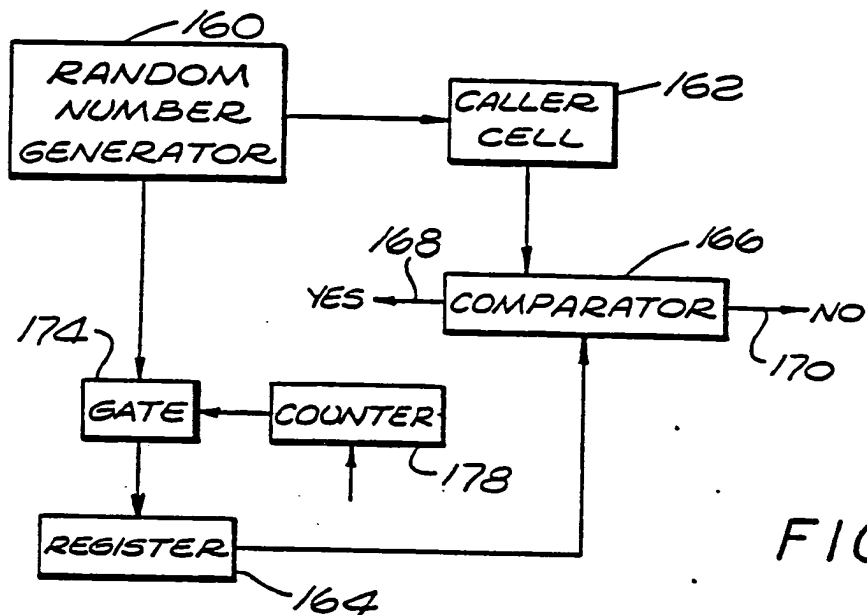


FIG. 6

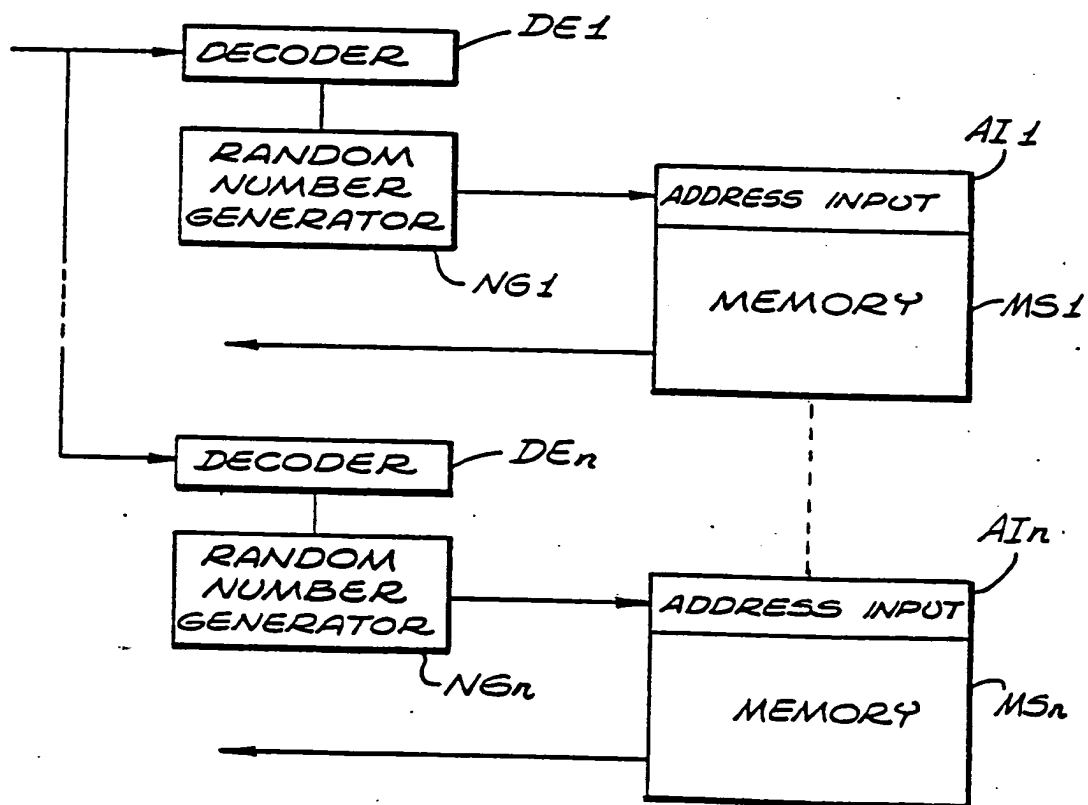


FIG. 8

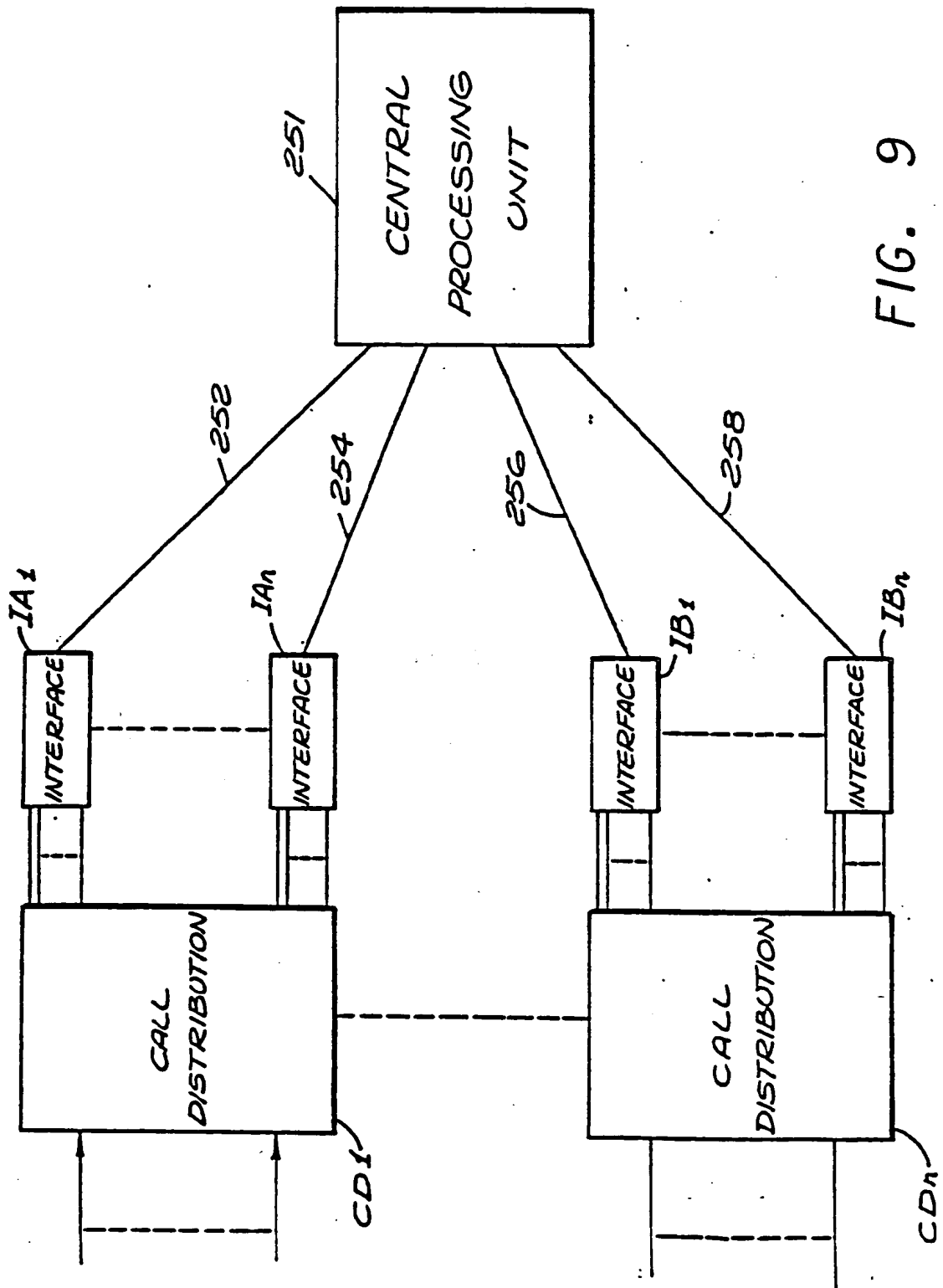


FIG. 9

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